AMENDMENTS TO THE SPECIFICATION

Change the title to read: HOLE-ASSISTED SINGLE MODE OPTICAL FIBER

Page 3, paragraph beginning on line 15, please change the paragraph as follows:

In addition, as for the SMF whose effective cross-sectional area Aeff is increased, the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode has a tendency to shift to a longer wavelength region. This presents a problem in that the effective operating wavelength region is limited to a longer wavelength region of 1400 nm or more, for example (refer to Japanese Patent Application Laid-open No. 2001-147338 (Claim 13 and paragraph [0022], for example).

Page 6, paragraph beginning on line 4, please change the paragraph as follows:

The radius r1 of the core region (10) can be from ~~3.2~~3.7 μm to 4.8 μm, and a relative index difference Δ of the core region (10) from the first cladding region (11) can be in a range from 0.3% to 0.55%.

Page 6, paragraph beginning on line 16, please change the paragraph as follows:

According to the present invention, it becomes possible to satisfy all the characteristics of the bending loss equal to or less than 1 dB/m at the bending radius 10 mm, and the effective cross-sectional area Aeff equal to or greater than 150 μm2 in a region in which the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode is equal to or less than 1500 nm and the operating wavelength is from 1260 nm to 1625 nm, for example, by providing, in addition to the core region and ~~first~~ cladding region having the same refractive index gradient as that of a conventional single mode fiber, the second cladding region having at least four air hole regions within the first cladding

region, and by optimizing the core radius r1, the relative index difference Δ of the core region, the air hole radius r2, and the distance d of the air hole regions, thereby offering a marked advantage of being able to implement the reduction in the optical nonlinearity in a wide single mode operation region.

Page 7, paragraph beginning on line 7, please change the paragraph as follows:

In addition, according to the present invention, it also becomes possible for the single mode fiber with the same structure as described above to satisfy the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode equal to or less than 1500 nm and the bending loss equal to or less than 1 dB/m at the bending radius 10 mm in the operating wavelength region from 1260 nm to 1625 nm, and to implement high bending loss resistance, to keep the MFD characteristics equivalent to that of the conventional SMF at the wavelength 1310 nm, and to make the variations in the MFD with reference to the conventional SMF equal to or less than ±10% even at the wavelength 1625 nm, thereby offering an advantage of being able to achieve good connection characteristics with the conventional SMF.

Page 7, paragraph beginning on line 20, please change the paragraph as follows:

Furthermore, since the single mode fiber in accordance with the present invention has a structure that provides many air hole regions to a single mode fiber with a prescribed refractive index profile, it can be fabricated comparatively easier ~~than this type of conventional single mode fiber~~.

~~Page 8, paragraph beginning on line 22, please change the paragraph as follows:~~

Fig. 4 is a characteristic diagram illustrating relationships between the normalized air hole

distance d/r1 and the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode of a hole-assisted single mode optical fiber of a first embodiment in accordance with the present invention;

Page 9, paragraph beginning on line 27, please change the paragraph as follows:

Fig. 10 is a characteristic diagram illustrating relationships between the relative index difference Δ in the core region and the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode of the hole-assisted single mode optical fiber in the second embodiment in accordance with the present invention.

Page 12, paragraph beginning on line 22, please change the paragraph as follows:

Fig. 2 shows that the requirements of the conventional SMF can be satisfied by designing in such a manner that the radius r1 of the core region 10 is in a range from about ~~3.2~~ 3.7 μm to 4.8 μm, and the relative index difference Δ is in a range from about 0.3% to 0.55%.

Page 13, paragraph beginning on line 27, please change the paragraph as follows:

Fig. 4 is a diagram illustrating relationships between the normalized air hole distance d/r1 and the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode of a hole-assisted single mode optical fiber in which the number of air holes is eight, and the air hole radius r2 is 0.4 times the core radius r1. The theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode of the foregoing conventional SMF whose relative index difference Δ is 0.32% and the core radius r1 is 4.5 μm is about 1450 nm. The hole-assisted single mode optical fiber in accordance with the present invention can also achieve the cutoff wavelength characteristic equivalent to that of the conventional SMF or less as illustrated in Fig. 4.

Page 15, paragraph beginning on line 12, please change the paragraph as follows:

Therefore, it is possible to achieve the characteristics that enable the relative variations in the present MFD with reference to the MFD of the conventional SMF to be curbed equal to or less than ±10% even at the upper limit 1625 nm of the operating wavelength by making the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode equal to or less than 1500 nm, by making the bending loss characteristic at the bending radius 10 mm equal to or less than 1 dB/m in the operating wavelength region from 1260 nm to 1625 nm, and by making the MFD at the wavelength 1310 nm from about 7.9 μm to 10.2 μm which is equivalent to that of the conventional SMF by making the design of the hole-assisted single mode optical fiber in accordance with the present invention, which has at least four air hole regions 12 as shown in Figs. 2, 3A-3C, 4, 5 and 6, in the range in which the distance d of the air hole regions 12 is 2.0 – 4.5 times the core radius r1, the radius r2 of the air hole regions 12 is 0.2 times the core radius r1 or more, the relative index difference Δ of the core region 10 is about 0.3% to 0.55%, and the core radius r1 is about ~~3.2~~3.7 μm to 4.8 μm.

Page 17, paragraph beginning on line 27, please change the paragraph as follows:

In addition, Fig. 10 is a diagram illustrating relationships between the relative index difference Δ of the core region 10 and the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode when using the relationships between the relative index difference Δ and the effective core radius A at the wavelength 1260 nm of Fig. 8.

Page 18, paragraph beginning on line 6, please change the paragraph as follows:

Therefore, as shown in Figs. 8, 9 and 10, it is possible for the second embodiment in

accordance with the present invention, in the single mode fiber with six air hole regions 12 which are placed at the distance d = 3×r1 from the center of the core region 10 and have the radius r2 = 0.3×r1, to achieve the characteristics that enable the effective cross-sectional area Aeff in the wavelength range from 1260 nm to 1625 nm to be equal to or greater than 150 μm2, and the bending loss at the bending radius 10 mm to be equal to or less than 1 dB/m by making the theoretical cutoff wavelength in the ~~fundamental~~ LP11 mode equal to or less than 1100 nm by making the design in the range in which the relative index difference Δ of the core region 10 is equal to or less than about 0.12%, and the effective core radius A is about from 23 μm to 28 μm.

Please change the Abstract to read as follows:

A single mode fiber is provided which is suitable for high-speed, large-capacity optical communication and for optical wiring. The single mode fiber has a first cladding region with a uniform refractive index, a core region with a refractive index higher than that of the first cladding region, and a second cladding region including at least four air hole regions placed in the first cladding region. Optimization can be achieved by making the distance from the center of the core region to the air hole regions equal to 2-4.5 times the core radius, and the air hole radius equal to or greater than 0.2 times the core radius. It is preferable the core radius be ~~3.2~~3.7-4.8 μm, the relative index difference of the core region from the first cladding region be 0.3-0.55%.